

# MANAGEMENT THROUGH ECO-FRIENDLY APPROACH OF COLLAR ROT DISEASE OF SUNFLOWER CAUSED BY *SCLEROTIUM ROLFSII* SACC IN SUNDARBANS OF WEST BENGAL

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## ABSTRACT

Cultivation of sunflower most preferable in rice fallow land in Sundarban region of west Bengal. Among the fungal diseases collar rot of sunflower caused by *Sclerotium rolfsii* Sacc. is serious problem of sunflower growers, keep in view of environmental hazard increasing day by day, the investigation was carried out in farmers field of Sundarbans of West Bengal. For which seven different bio-products were selected, viz. *T. viride*, *T. harzianum*, *P. fluorescence*, cow urine, Neem (*Azadirachta indica*), Tulsi (*Ocimum sanctum*) and *Datura* (*Datura stramonium*). Among the different bio-products *T. viride* and *T. harzianum* were showed best result followed by cow urine, *Datura* to reduce the percent disease incidence over control, as well as in yield performance. Percentage decrease in PDI over control was showed best in *T. viride* and *T. harzianum*

**KEYWORDS:** Sundarbans, Sunflower, Collar Rot, Eco-Friendly Management

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## INTRODUCTION

Sunflower is one of the fastest growing oilseed crops in India popularly known as "Surajmukhi." In India, sunflower as an oilseed crop was introduced in 1969. Oilseed crops play an important role in the national economy and rank second after food grains. Sunflower (*Helianthus annuus* L.) is an important oil seed crop. Presently, India has the fourth largest area under sunflower (2.10 m.ha) in the world and accounts for 10 per cent of the world acreage. Its share in total world production is about five per cent (1.20 Mt.). However, the yield at 570 kg/ha is the lowest amongst the major sunflower producing countries in the world (Anon., 2003). Area, Production and Productivity of sunflower in India 721900 ha and 499900 tons respectively, however in West Bengal 8000 ha and 28400 tons respectively with productivity 17.44 Q/ha<sup>-1</sup> in the year 2011-12 (Anonymous, 2013). Among several diseases collar rot caused by *Sclerotium rolfsii* most serious problem, *Sclerotium rolfsii* is a polyphagous pathogen which infects many of the cultivated crop plants viz. sunflower, potato, chilli, groundnut, onion, tomato, betel vine etc. (Agrios, 2005). The fungus was first reported by Rolfs (1892) as a cause of tomato blight in Florida. Saccardo (1911) named the fungus as *S. rolfsii* sp. *Sclerotium rolfsii* is a soil borne plant pathogen causing root rot, stem rot, collar rot, wilt and foot rot diseases on more than 500 plant species of agricultural and horticultural crops throughout the world (Aycock, 1966). Collar rot or Southern blight of sunflower incited by *S. rolfsii* has been reported in Asia, South America, China, India, Pakistan, Spain, Iran, Israel, Uruguay, Australia, Egypt, Portugal and South Africa. In most of these countries, the disease is considered of minor importance, except in India and Pakistan (Gulya et al., 1997) it causes yield losses of 10-11 % with infection of 10-11% if the sunflower crop is

planted in July and August or in February and March in the Nanital Tarai region of Uttar Pradesh (Kolte and Tewari, 1977). The typical symptoms of the disease is rapid wilting and sickly appearance of plants with brownish lesion at the stem base near the soil lane which later girdles the stem. White mycelial growth forms over the infected tissue and often radiates over the soil surface. Eco-friendly approach is very important aspects to avoid the health hazards.

## MATERIALS AND METHODS

The experiment was conducted during Rabi/Summer season of 2013– 2014 and 2014-15 two successive cropping season farmers field of the coastal region. For plant extract, fresh samples were collected and washed in tap water and washed thrice using sterilized distilled water. The excess water was wiped out with tissue paper and weighed. The sample was crushed in a sterilized pestle and mortar by adding sterile distilled water at a ratio of 1:1 (w/v) to get the standard extract. Filtered through muslin cloth and the filtrate was centrifuged at 5000 rpm for 15 min. 20% were prepared by adding required quantity of sterile water into the stock solution (standard extract). For cow urine, fresh cow urine was collected in a sterile container from a local variety of cow. The urine was filtered through Whatman No. 1 filter paper to get rid of debris and precipitated material and was stored in airtight container at 4°C before use. In case of bio control agent *T. viride*, *T. harzianum* and *P. fluorescence* used with talc formulation @ 5gm/lt methods of Nandakumar et al. (2001). Variety KBSH-44 was sown spacing with row to row 60 cm and plant to plant 30 cm. Different fungicides were used along with an untreated check. Each treatment was applied to in a randomized block design with three replications. Germinated seeds of the variety were sown in field. At the time of land preparation farm yard manure applied 15 tons/ha. NPK at the rate of 80:40:40 ha at recommended dose as basal dose half Nitrogen applied full amount of phosphorus and potash rest amount of nitrogen 1/4th at 25 DAS and 1/4th at 45 DAS 0.2% boric acid sprayed at ray floret stage Irrigation and other cultural practices were done as usual. Three sprays of each treatment were done at 15 days interval starting from the date of first symptom appearance approx 30 days after sowing at recommended dose. The required quantities of chemicals were weighed and suitably dissolved in a requisite quantity of water to get desired concentrations. The observations and per cent disease incidence were calculated. Plant spacing was Plant to plant; 30cm, row to row; 60cm, each plot of size were 5X4.8 m.

**Table 1: Eco-Friendly Management Agent as Listed Below**

Sl. No.	Agents	@Dose
1	<i>T. viride</i>	5gm/lt
2	<i>P. fluorescence</i>	5gm/lt
3	<i>T. harzianum</i>	5gm/lt
4	Cow urine	20%
5	Neem ( <i>Azadirachta indica</i> )	20%
6	Tulsi ( <i>Ocimum sanctum</i> )	20%
7	Datura ( <i>Datura stramonium</i> )	20%
8	Control	

## RESULTS AND DISCUSSIONS

The result of the present study is revealed that among the management options *T. viride*. 5.95 and 6.55 in the year of 2013-14, however in the year of 2014-15 *T. harzianum* 5.95 was showed reduced highest disease incidence in both the year over the control. Followed by *T. viride* as well as in yield. Bacterial antagonistic *P. fluorescence* was reduced minimal PDI over control in both the year. Datura and Cow urine significantly reduced the disease incidence after *t. viride* and *t.*

*harzianum* as well as in yield. *Trichoderma* spp. and *P. fluorescens* reduced the disease incidence and increased the yield by 15.5-37.5 and 14.8-30.3%, respectively over the untreated control M. NARAYANA BHAT et.al. (2015). Meena et al. (2000) reported that *Azadirachta indica* as effective against *S. rolfsii*. Least average mycelial growth was recorded with neem (22.66 mm) followed by tulsi (29.63 mm) in *in-vitro* condition Begum et.al. (2014). Gupta et.al. (2012) shows the maximum disease control was observed in neem (75.7%), tulsi (52.3%).

**Table 2: Percentage Disease Incidence against the Disease**

Treatments	2013-14				2014-15			
	PDI	% Decrease in PDI	Yield (Q/ha)	% Increase in yield	PDI	% Decrease in PDI	Yield (Q/ha)	% Increase in yield
<i>T. viride</i>	5.95 (14.63)*	71.83	18.29	19.25	6.55 (15.39)*	69.44	18.23	19.32
<i>P. fluorescence</i>	17.56 (24.77)	16.9	16.03	4.53	16.67 (25.06)	22.22	16.20	6.06
<i>T. harzianum</i>	6.55 (14.82)	69.01	18.17	18.49	5.95 (14.63)	72.22	18.29	19.70
Cow urine	14.88 (22.69)	29.58	16.55	7.92	12.20 (21.23)	43.05	17.07	11.74
Neem leaf extract	15.77 (23.40)	25.35	16.38	6.79	15.18 (23.80)	29.16	16.49	7.95
Tulsi	17.56 (24.77)	16.9	16.03	4.52	16.96 (25.29)	20.83	16.14	5.68
Datura	14.29 (22.20)	32.39	16.67	8.68	13.69 (22.56)	36.11	16.78	9.84
Control	21.13 (27.36)	0	15.33	0	21.43 (28.71)	0	15.28	0
SE m	0.55		0.12		0.65		0.14	
CD (at 5%)	1.68		1.26		1.99		1.47	

\*Angular transformed value

## CONCLUSIONS

From the result it can be concluded that among the management options *T. harzianum* and *T. viride* were best where *T. harzianum* and *T. viride* not available for that place Datura leaf extract and cow urine may be the alternative options to control the disease.

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